Semi-Annual Report

(Report No. 3)

for the period

1 July 1965 through 31 December 1965

DEVELOPING A SYSTEM OF SOLAR FLARE PREDICTION

ARPA order #215, Amendment #14
Project Code #RR002-10-01, 1-24

Name of Contractor

The Regents of the University of Colorado
Boulder, Colorado

Date of Contract: January 1, 1965

Contract Expiration Date: December 31, 1966

Amount of Contract: $17,500

Contract Number: Nonr 1147(13)

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Office of Naval Research
Washington, D. C.

Attention: Director, ARPA

Reference: Contract#Nonr 1147(13)
Semi-Annual Report for the Period
1 July 1965 through 31 December 1965.

Gentlemen:

Work on the contract was continued by Mr. Lorne Avery under the direction of Dr. Billings.

During the report period we concluded the light-curve study mentioned in Semi-annual report #2, and concluded that it was the bright portion of the $H\alpha$ emissi[on] near the core of flares, rather than the extended filaments of flare r[egion] that have curves corresponding to the x-ray emission. Photometric [observations] make this conclusion quite indecisive, however.

Next we turned our attention to the phenomenon of the long-period tendency of the same solar longitude to be the source of activity. This phenomenon has been studied rather extensively by Guss, C. Warwick, and Trotter and Billings. We looked into coronal data at high latitudes preceeding the past sunspot cycle to see if this longitude preference could be detected in the coronal emission that has been shown by Bell and Waldmeier to preceed the outbread of actual sunspot activity by several years. We found some evidence for a preference for the longitudes that were to become active later, but nothing conclusive.

Avery is now turning his attention to the choice of a thesis topic that will have bearing on flare prediction and give promise of leading to some definite conclusion concerning flares. He is considering one of two general fields--the study of flare radiation phenomena, using a Monte Carlo method suggested by Dr. House of the High Altitude Observatory, or the study of the growth of sunspots, using some new hydromagnetic concepts developed by Dr. M. Altschuler, also of the High Altitude Observatory. Both methods seem to offer considerable promise. If Avery chooses the radiation problem, Billings will probably continue to work with Altschuler on the prediction of the growth or decay of sunspots. Since flares seem to be almost inevitable when a condition of large gradient in the sunspot magnetic fields normal to the solar survac exists, the prediction of the course of growth of spots in a group could lead rather directly to effective flare prediction.

Respectfully submitted,

Donald E. Billings

Donald E. Billings
Project Director

DEB:kc

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Security Classification

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(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

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13. ABSTRACT

We have concluded a rather indecisive study of flare light curves compared to x-ray data, and another looking for very early evidence of a preferred longitude for solar activity. We now turn our attention to basic principles of flare radiation and sunspot growth.

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Security Classification

14. KEY WORDS	LINK A		LINK B		LINK C	
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